

REMARKS

The above-identified patent application has been amended and Applicants respectfully request the Examiner to reconsider and again examine the claims as amended.

Claims 1, 4-18, 29-33, and 36-39 are pending in the application. Claims 1, 4-18, 29-33, and 36-39 are rejected. Claims 1, 12, 13, 29, 31, 32, and 39 are amended herein. Claims 4, 30, and 38 are also amended herein, but not for reasons of patentability, as will be apparent. Claims 40 and 41 are new.

Applicants' Attorney would like to thank Examiner Ngo for the courtesy extended to Applicants' attorney during a telephone interview on January 3, 2008. Rejections of Claims 1, 12, 13 (and corresponding claims 31 and 32), and Claims 29 of the present Office action were discussed. No agreement was reached regarding Claims 1 and 29. However, amended language adopted herein directed to a flip-chip arrangement was discussed in detail and Applicants' Attorney believes that Examiner Ngo will favorably consider the amended claim language. With regard to Claims 12 and 13 (and corresponding claims 31 and 32), the Examiner indicated that he would favorably consider Claims 12 and 13 having details of the direction in which the claimed cross section is taken, as set forth herein in amended Claims 12 and 13 (and corresponding claims 31 and 32).

As an initial matter, Applicants cannot identify that certain signed and initialed information disclosure forms (PTO Form 1449 or SB08) have been returned as identified below. Applicants respectfully request that the Examiner consider the art cited in the below-identified information disclosure statements (if not already done) and provide the signed and initialed information disclosure forms as indicated.

- 1) Electronically submitted on October 13, 2006
- 2) Electronically submitted on October 18, 2006

The Rejections under 35 U.S.C. §102(b)

The Examiner rejects Claims 29-31 under 35 U.S.C. §102(b) as being anticipated by Japanese provisional patent publication number JP 2002-40058, referred to hereafter as the 40058 publication.

Applicants submit that amended independent Claim 29 is patentably distinct over the 40058 publication, since the cited reference neither describes nor suggests “...a lead frame having a plurality of leads and having a current conductor portion comprising a coupling of at least two of the plurality of leads, wherein the coupling of at least two of the plurality of leads comprises a loop, the at least two of the leads and the loop forming a continuous electrical path entirely formed of lead frame material; a substrate having first and second opposing surfaces, the first surface proximate to the current conductor portion and the second surface distal from the current conductor portion, wherein at least some of the leads of said lead frame are electrically coupled to said substrate...,” as set forth in Claim 29. Support for this arrangement can be found in many of the figures, for example, in FIG. 1.

With this particular arrangement, the present invention conveniently provides the claimed current conductor portion as a continuous coupling of leads of a conventional lead frame, some other leads of which are electrically coupled to the substrate. In contrast, the 40058 publication provides a current path plate (element 4 of FIGS. 2-4), which is necessarily a structure apart from and separate from a conventional lead frame, of which elements 22-25 are indicative. From FIG. 3 of the 40058 publication, it should be apparent that a current path plate 4 and the leads 22-25 are in different planes. Therefore, Applicants submit that the current path plate 4 cannot be a part of a lead frame with the leads 22-25, some of which are coupled to the substrate 20.

In view of the above, Applicants submit that Claim 29 is patentably distinct over the 40058 publication.

Claims 30 and 31 depend from and thus include the limitations of Claim 29. Thus, Applicants submit that Claims 30 and 31 are patentably distinct over the cited reference at least for the reasons discussed above in conjunction with Claim 29.

Applicants submit that amended Claim 31 is further patentably distinct over the 40058 publication, since the cited reference neither describes nor suggests "...at least a part of the current conductor has a T-shaped cross section, the T-shaped cross section taken through a thickness direction of the current conductor portion, the T-shaped cross section resulting in an increased magnetic field proximate to the current conductor portion, and therefore, proximate to said one or more magnetic field transducers," as set forth in Claim 31. The claimed T-shaped cross section is shown, for example, in FIG. 9A of the present patent application. The Examiner indicates that the claimed T-shaped cross section can be found in FIG. 9 of the 40058 publication. However, FIG. 9 of the 40058 publication is not a cross-sectional view. Applicants submit that the current conductor 4 of the 40058 publication has a uniform thickness, and therefore, a rectangular cross section, not a T-shaped cross section as claimed.

In view of the above, Applicants submit that the rejection of Claims 29-31 under 35 U.S.C. §102(b) should be removed.

The Rejections under 35 U.S.C. §103(a)

The Examiner rejects Claims 1, 4-18, 32, 33, and 36-38 under 35 U.S.C. §103(a) as being unpatentable over Japanese provisional patent publication number JP 2002-40058, referred to herein as the 40058 publication, in view of Popovic et al. (U.S. Patent number 5,247,202).

According to the Federal Register, Volume 72, No. 195, dated October 10, 2007, at page 57528. Part III of the section entitled "Examination Guidelines for Determining Obviousness under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*," in order to establish a prima facie case of obviousness "...the prior art reference (or prior art references when combined) need not teach or suggest all the claim limitations." However, as

also stated in Part III, in order to establish prima facie obviousness, “[t]he gap between the prior art and the claimed invention may not be ‘so great as to render the [claim] nonobvious to one reasonably skilled in the art.’” Applicants respectfully submit that the Examiner has not met this burden in order to establish prima facie obviousness.

Applicants submit that amended Claim 1 is patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest “...a lead frame having a plurality of leads and having a current conductor portion comprising a coupling of at least two of the plurality of leads...; a substrate having first and second opposing surfaces, the first surface proximate to the current conductor portion and the second surface distal from the current conductor portion, wherein at least some of the leads of said lead frame are electrically coupled to said substrate; and one or more magnetic field transducers disposed on the first surface of said substrate, wherein said substrate and said lead frame are relatively disposed in a flip-chip arrangement resulting in the current conductor portion being proximate to said one or more magnetic field transducers, and further resulting in an increased sensitivity of the integrated circuit to a magnetic field,” as set forth in Claim 1. Applicants submit that such omission represents a gap between the prior art and the claimed invention that is so great as to render the claim nonobvious to one reasonably skilled in the art.

The claimed arrangement is upside down from a conventional arrangement, i.e., with the active surface 16a (the surface supporting the magnetic field transducer 18) of the substrate 16 disposed downward and toward the lead frame 12. In a conventional integrated circuit arrangement, the active surface 16a is disposed upward and away from the lead frame.

In contrast, referring to FIG. 3 of the 40058 publication, the substrate 20 and the lead frame (leads 22-25) are not relatively disposed in a flip-chip arrangement, but rather, are disposed in a conventional arrangement.

Applicants make note that the Examiner, in the above-mentioned telephone interview, suggested that, in FIG. 2 of the 40058 publication, the current path plate 4 having elements 7a, 8a forms a lead frame. However, as set forth in amended Claim 1, the claimed lead frame having the current conductor portion is relatively disposed in a flip-chip arrangement with the substrate, wherein at least some of the leads of said lead frame are electrically coupled to the substrate, which arrangement is unlike the 40058 publication. The claimed relative flip chip arrangement brings the current conductor portion closer to the magnetic field transducers, resulting in increased sensitivity as claimed.

Furthermore, the 40058 publication, in FIG. 2, employs a resin 30 between the substrate 20 and the current path plate 4, presumably to provide electrical isolation. Therefore, Applicants submit that not only does the 40058 publication fail to describe or suggest coupling its current path plate 4 to the substrate 20, but to do so would clearly destroy the electrical isolation the 40058 publication attempts to achieve. Therefore, one of ordinary skill in the art having the 40058 publication would not be motivated to provide a substrate and a lead frame relatively disposed in a flip-chip arrangement, wherein at least some of the leads of the lead frame are electrically coupled to the substrate as claimed.

Applicants submit that Popovic et al. fails to overcome the above deficiencies in the 40058 publication. In FIG. 2, Popovic et al. shows a conventional arrangement for which a substrate 4 is conventionally mounted to a lead frame 8, as contrasted to the claimed flip-chip arrangement. Other figures of Popovic et al. teach the same conventional arrangement.

In view of the above, Applicants submit that Claim 1 is patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al.

Claims 4-18 and 36-38 depend from and thus include the limitations of Claim 1. Thus, Applicants submit that Claims 4-18 and 36-38 are patentably distinct over the cited references at least for the reasons discussed above in conjunction with Claim 1.

Applicants submit that Claim 4 is further patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest that the "... current conductor portion further comprises a conductive clip coupled to the at least two of the plurality of leads," as set forth in Claim 4. This claimed arrangement is shown, for example, in FIG. 7, in which a conductive clip 204 couples leads 202a and 202b to leads 202c and 202d, thereby forming a current conductor. The Examiner indicates that the conductive clip can be found in FIG. 9 of the 40058 publication. However, FIG. 9 of the 40058 publication is indicative of a current path plate without any conductive clip. Furthermore, the claimed conductive clip is coupled to at least two of the leads of a lead frame, wherein some of the leads are electrically coupled to the substrate, which is not contemplated by the cited references.

Claims 5-7 depend from and thus include the limitations of Claim 4. Thus, Applicants submit that Claims 5-7 are patentably distinct over the cited references at least for the reasons discussed above in conjunction with Claim 4.

Applicants submit that Claim 11 is further patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest "... said one or more magnetic field transducers are rotated relative to each other for providing predetermined voltage output polarities," as set forth in Claim 11. The Examiner uses FIG. 10 of the 40058 publication to show this characteristic. However, Applicants can find no reference to rotations or polarities in the 40058 publication.

Applicants submit that amended Claim 12 is further patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest "... at least a part of the current conductor portion has a T-shaped cross section, the T-shaped cross section taken though a thickness direction of the current conductor portion, the T-shaped cross section resulting in an increased magnetic field proximate

to the current conductor portion, and therefore, proximate to said one or more magnetic field transducers," as set forth in Claim 12. As described above, the claimed T-shaped cross section is shown, for example, in FIG. 9A of the present patent application. The Examiner indicates that the claimed T-shaped cross section can be seen in FIG. 9 of the 40058 publication. However, FIG. 9 of the 40058 publication is not a cross-sectional view. Applicants submit that the current conductor 4 of the 40058 publication has a uniform thickness, and therefore, a rectangular cross section, not a T-shaped cross section as claimed.

Applicants submit that amended Claim 13 is further patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest "... at least a part of the current conductor portion has a thinned rectangular cross section having a minimum dimension less than a thickness of other portions of said lead frame, the thinned rectangular cross section taken though a thickness direction of the current conductor portion, the thinned rectangular cross section resulting in an increased magnetic field proximate to the current conductor portion, and therefore, proximate to said one or more magnetic field transducers," as set forth in Claim 13. Thus, the lead frame of the claimed arrangement has at least two thicknesses. In contrast, Applicants submit that the current conductor 4 of the 40058 publication has a uniform thickness.

Claims 32 and 33 depend from and thus include the limitations of Claim 29. Thus, Applicants submit that Claims 32 and 33 are patentably distinct over the cited references at least for the reasons discussed above in conjunction with Claim 29.

Applicants submit that Claim 33 is further patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest "... each one of the leads has a bend in a direction selected to result in each one of the leads being closer to the first surface of said substrate than to the second surface of said substrate throughout a length of the lead," as set forth in Claim 33. With regard to the bend

of the leads, Applicants maintain the position they set forth in the Amendment filed August 16, 2007.

Applicants submit that Claim 37 is further patentably distinct over the 40058 publication, whether taken alone or in combination with Popovic et al., since the cited references neither describe nor suggest "...a stud bump disposed to electrically couple said substrate to said lead frame," as set forth in Claim 37. Stud bumps will be recognized to be elements particular to flip-chip assembly and electrical connection. The Examiner again makes no comment about Claim 37.

In view of the above, Applicants submit that the rejection of Claims 1, 4-18, 32, 33, and 36-38 under 35 U.S.C. §103(a) should be removed.

Claims 40 and 41 are new in the application. Consideration of new Claims 40 and 41 is respectfully requested.

In view of the above Amendment and Remarks, Applicants submit that the claims and the entire case are in condition for allowance and should be sent to issue and such action is respectfully requested.

The Examiner is respectfully invited to telephone the undersigning attorney if there are any questions regarding this Amendment or this application.

The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 500845, including but not limited to, any charges for extensions of time under 37 C.F.R. §1.136.

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Respectfully submitted,

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